INSTRUCTION MANUAL

FOR
UNDERFREQUENCY/OVERVOLTAGE MODULE

Models: UFOV 250A & UFOV 260A

Part Numbers: 9 1051 00 105 & 9 1051 00 106

Basler Electric

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WARNING

To prevent personal injury or equipment damage, only qualified technicians/operators should install, operate, or service this device.

CAUTION

Meggers and high potential test equipment should be used with extreme care. Incorrect use of such equipment could damage components contained in the device.

It is not the intention of this manual to cover all details and variations in equipment, nor does it provide data for every possible contingency regarding installation or operation. The availability and design of all features and options are subject to change without notice. Should further information be required, call Basler Electric Company, Highland, IL.

SECTION 1
GENERAL INFORMATION

1-1. DESCRIPTION

a. The Underfrequency Overvoltage Module prevents the voltage regulator from maintaining the rated generator output voltage when the generator frequency decreases more than 4 to 7 Hz below nominal. When the underfrequency circuit assumes control, the generator output voltage reduction is proportional to the degree of the underfrequency condition. When the frequency returns to nominal, the output of the regulator is automatically increased and the generator output voltage will return to nominal. Table 1 provides data on model/part number cross-reference and unit applicability.

Table 1-1. Part Number Cross-Reference and Unit Applicability.

Model Number	Part Number	Frequency	Applicable Regulators
UFOV 250A	9 1051 00 106	50 Hz	SR4A, SR4F, SR8A, SR8F, SR32A, SR32H, SR63H, SR125H, SR250H
UFOV 260A	9 1051 00 105	60 Hz	

b.To provide overvoltage protection, a circuit breaker will trip when the applied voltage (generator output) exceeds a predetermined value (normally 125 to 150% of nominal). The circuit breaker contacts are connected in series with the voltage regulator power input lines to remove the regulator input power and thus shut down the regulator when the breaker trips.

1-2. SPECIFICATIONS

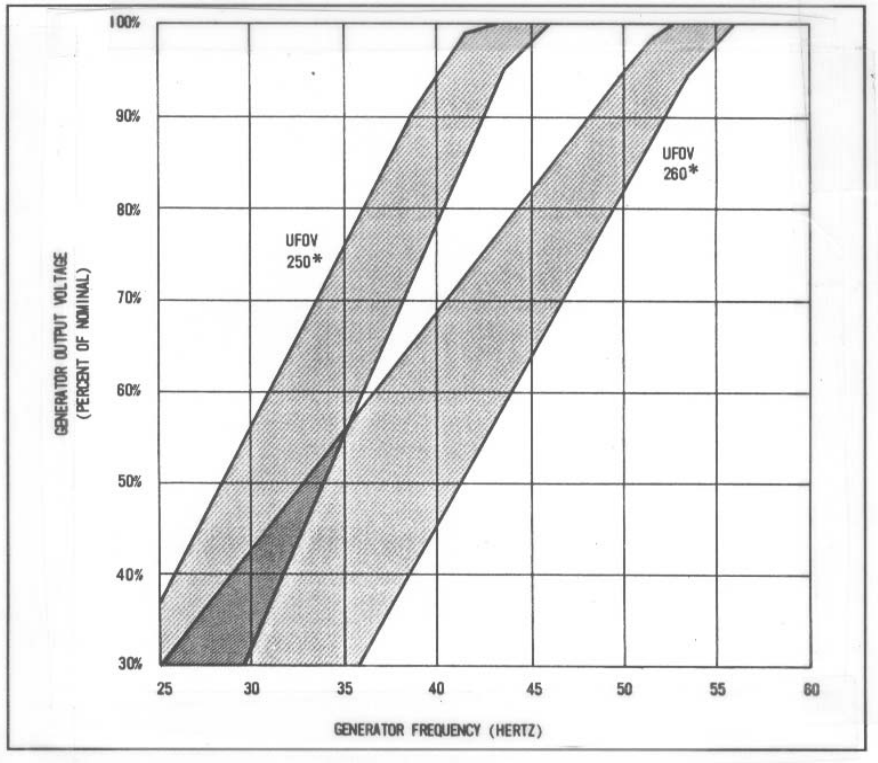
The Underfrequency Overvoltage Module electrical specifications are given in Table 1-2 and the mechanical specifications are given in Table 1-3.

Table 1-2. Electrical Specifications.

Input Voltage: **UFOV 250A:** **UFOV 260A:**	 120, 208, 240, 416, 480, 600 Vac, 50 Hz, 1-phase 120, 208, 240, 416, 480, 600 Vac, 60 Hz, 1-phase
Underfrequency Threshold:	4 to 7 Hz below nominal.
Underfrequency Operational Parameter:	Refer to Figure 1-1.
Overvoltage Adjust Limits:	125 to 150 % of nominal.
Circuit Breaker **P/N 05390:** **P/N 05391:**	 Single-pole, Contacts: 50 A @ 480 Vac Double-pole, Contacts: 50 A @ 480 Vac

Table 1-3. Mechanical Specifications.

Vibration:	Withstands the following: 5 to 27 Hz at 1.3 G's; 27 to 52 Hz at 0.035" displacement; and 52 to 500 Hz at 5 G's.
Shock:	Withstands 15 G's in any of three mutually perpendicular planes.
Ambient Operating Temperature:	-55°C (-67°F) to +70°C (+156°F)
Mounting:	Designed for "back-of-the-panel" mounting.
Weight:	10 lbs. (4.5 kg) net; 12 lbs. (5.5 kg) shipping.



NOTE:

1. If the generator is operated at less then rated speed, the regulator output current to the exciter field is reduced and the generator output voltage is proportionately decreased. The graph indicated the percentage of generator output voltage that will be obtained for a specific reduction in frequency. For example: If a 60 Hz generator is operating at 50 Hz, the generator output voltage will be between 82 and 95% of nominal. The "spread" in the envelope (shaded area) is a function of operational temperature and normal component tolerance.

2. * All data applies to part numbers 9 1051 00 105 (UFOV 260A) and 9 1051 00 106 (UFOV 250A). Similar units of earlier design (part numbers 9 0400 00 100 and 9 0400 00 104), were also identified with Model Numbers UFOV 250 and UFOV 260. Those earlier units have an underfrequency operational threshold of 10 Hz below nominal. For further information, contact the factory.

Figure 1-1. Underfrequency Operational Parameters.

SECTION 2
PRINCIPLES OF OPERATION

2-1. UNDERFREQUENCY CIRCUIT

Once the speed of the generator is slow enough for the underfrequency circuit to function, a definite speed-voltage relationship will be present. In general, the voltage will drop at a slightly faster rate then the speed. For example, at 50% generator speed, the generator output voltage will be less than 50%. The same relationship exists when the generator speed is increased (provided that the field flashing relay in the regulator is energized). It should be noted that the field flashing relay overrides the function of the underspeed circuit on initial build-ups. For extended low speed operation, care must be taken to ensure that the field flashing relay has been energized and the underfrequency circuit is in control of the generator output.

2-2. OVERVOLTAGE CIRCUIT

a. This circuit prevents sustained high voltage excursions in the generator-regulator system. During an overvoltage condition that exceeds the setting of this circuit, the regulator's input power will be interrupted by the tripping of the circuit breaker. The circuit breaker must be manually reset before regulator operation can resume. If the overvoltage circuit breaker repeatedly trips upon load rejection, the overvoltage trip is adjusted too low for the system requirement.

b. The tripping point of the breaker is preset at the factory for a trip at 130% of nominal generator output voltage. If the overvoltage circuit is tripped at any time, the reason for the overvoltage should be determined before resetting the breaker. Continued tripping during load rejection may indicate that the unit is being tripped on the peak of the load rejection transient.

c. The overvoltage trip is adjustable from approximately 125 to 150% of the nominal generator output voltage. The unit should be set high enough to pass normal voltage transients. Circuit breaker P/N 05391 must be used if terminal A is used on the SR-A series of regulators or if terminal F0 is used on the SR-F or SR-H regulators.

SECTION 3
INSTALLATION AND OPERATION

3-1. MOUNTING

The UFOV 250A and UFOV 260A can be mounted in any position without affecting the operating characteristics of the unit. Refer to Figure 3-1 for the Underfrequency Overvoltage Module outline drawing, Figure 3-2 for the single-pole circuit breaker outline drawing, and to Figure 3-3 for the double-pole circuit breaker outline drawing.

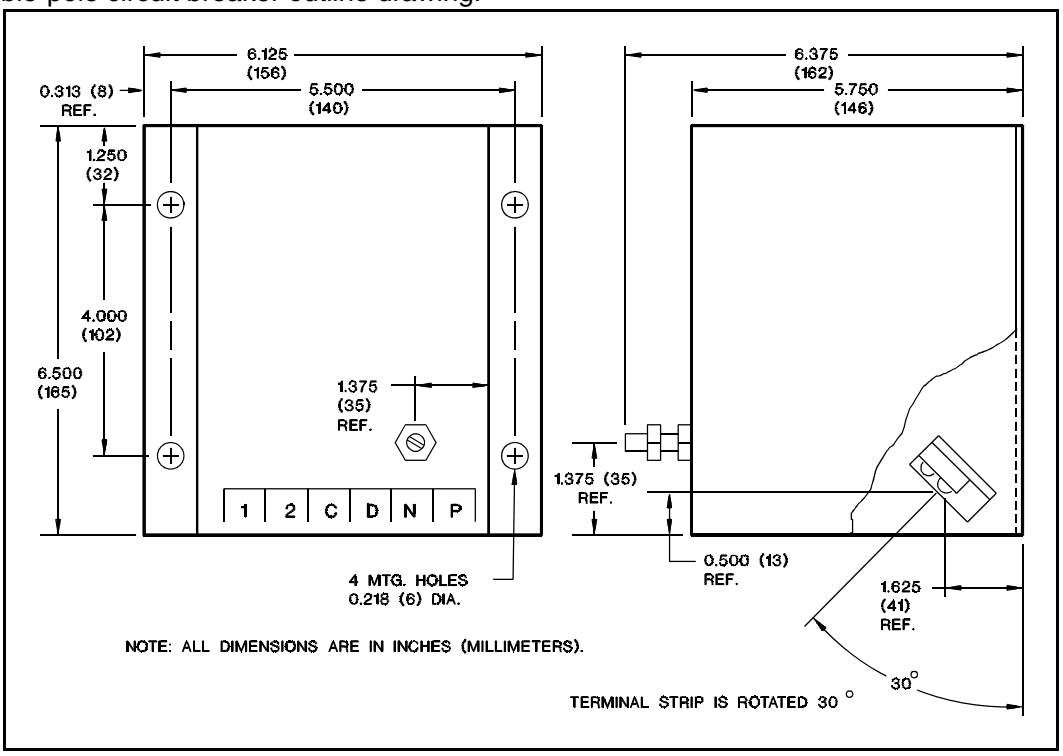


Figure 3-1. Underfrequency Overvoltage Module Outline Drawing,

3-2. INTERCONNECTION

a. General. The unit is connected to the regulating system as shown in Figures 3-4 through 3-9. A check of the complete system wiring for completeness and correctness should be made before system operation is attempted.

CAUTION

When an SBO (Excitation Support System) is used, the UFOV sensing input must be connected to the SBO input rather than to the regulator power input in order to provide the overvoltage limiting. The UFOV Module is factory connected for 120 Vac. If other voltages are required, the unit must be modified per paragraph 3-2b.

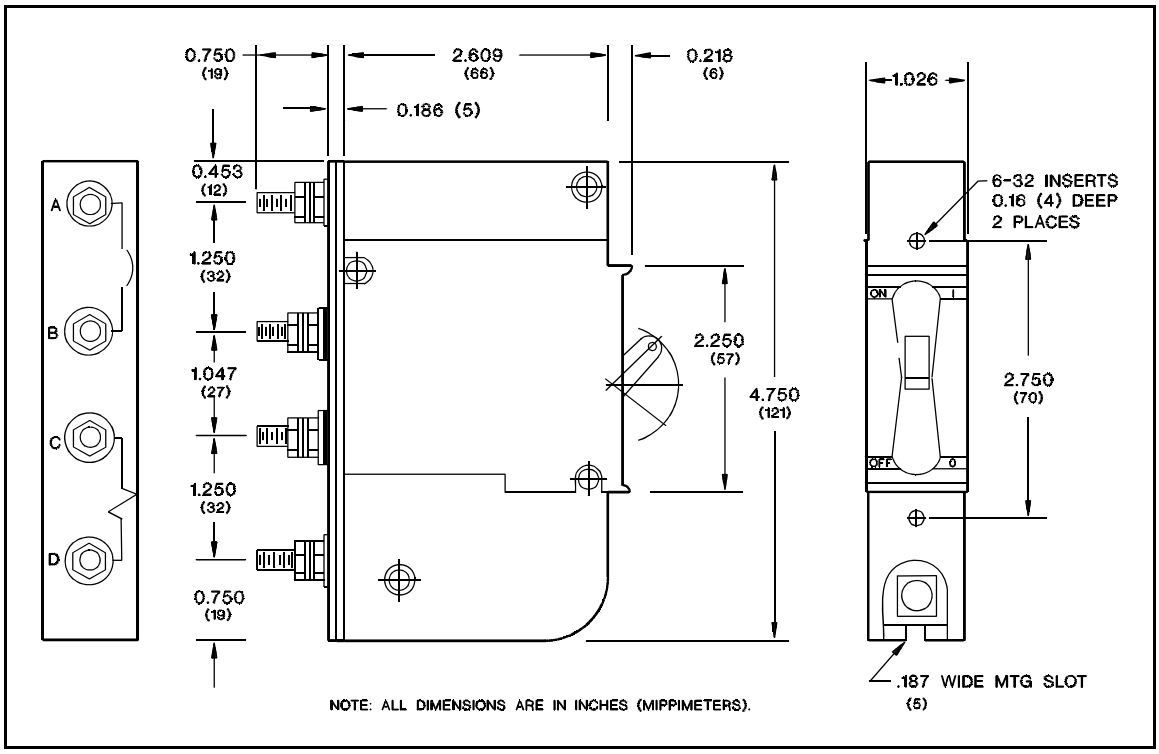


Figure 3-2. Single-Pole Circuit Breaker Outline Drawing.

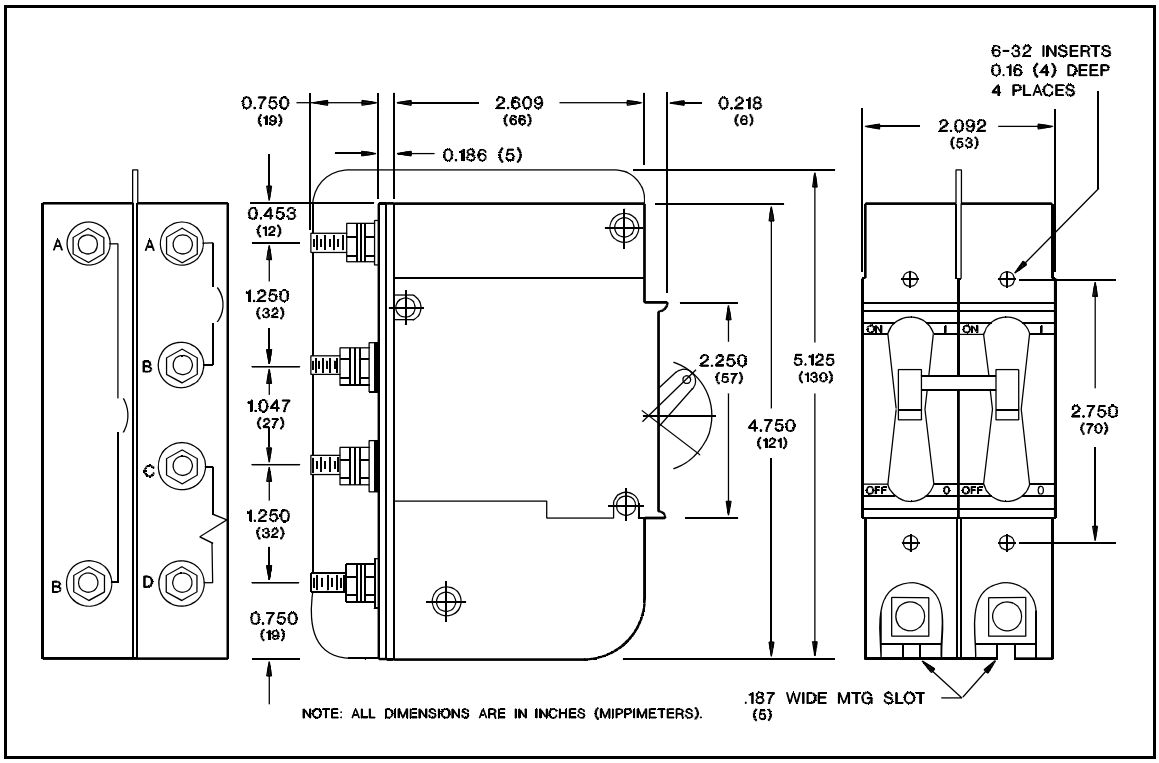


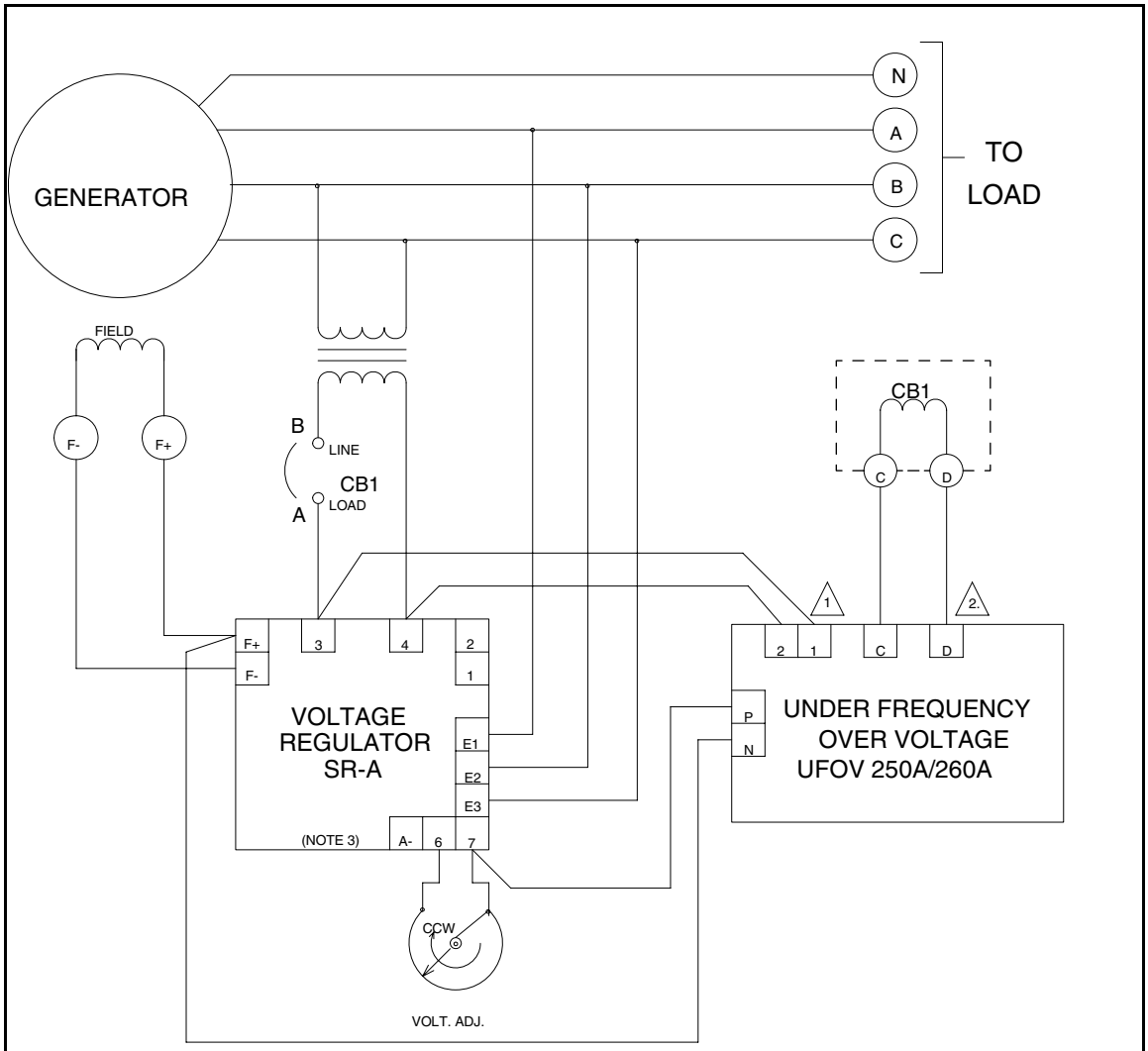
Figure 3-3. Double-Pole Circuit Breaker Outline Drawing.

b. Input Power (Terminals 1 and 2). The UFOV modules have an internal transformer provided with taps for input voltages of 120, 208, 240, 416, 480, or 600 Vac. When shipped, the units are factory connected for 120 V input (unless otherwise specified). To operate the unit on any other input voltage, remove the wire from its existing tap and connect it to the voltage tap desired. For operation on generators with voltages over 600 Vac, a potential transformer must be used (refer to the applicable voltage regulator manual or contact the factory for further information.

c. Interconnection with an EMI Filter Pack.

(1) When the UFOV 250A/260A is used in conjunction with the EMI filter pack, the UFOV module terminal N must be connected directly to the F+ terminal of the voltage regulator. Refer to Figure 3-8.

(2) EMI 248 and 208 Filter Packs. Connect a 14 gauge wire from terminal N of the UFOV module to terminal F+ of the EMI filter pack. Ensure that this connection is not grounded. Refer to Figure 3-9.



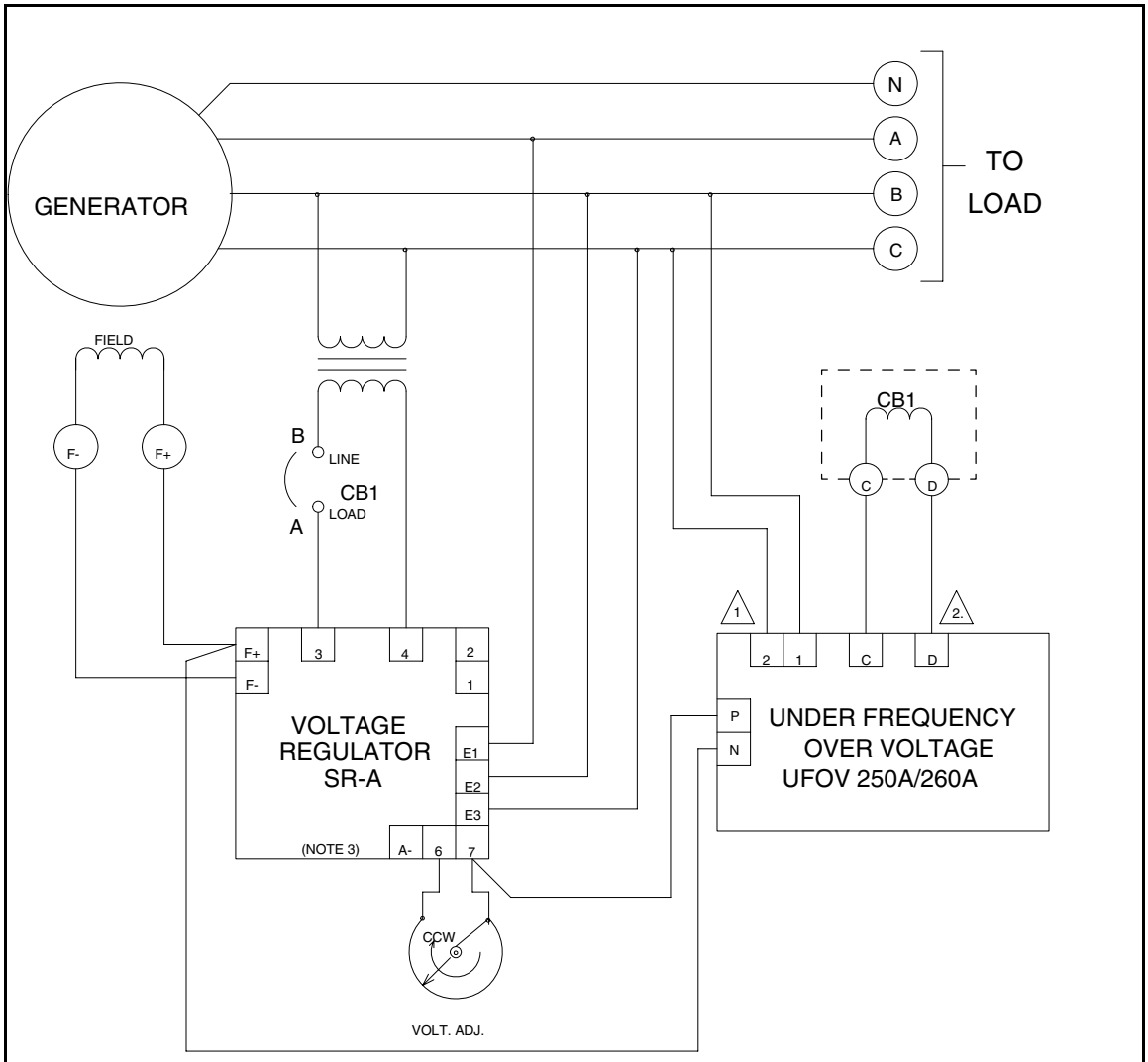
NOTES:

1. INPUT POWER (TERMINALS 1 & 2): THIS UNIT HAS AN INTERNAL VOLTAGE AND FREQUENCY SENSING TRANSFORMER (T1) WITH TAPS FOR 120, 208, 240, 416, 480, OR 600 VAC. THIS TRANSFORMER IS CONNECTED FOR 120 VAC OPERATION UNLESS OTHERWISE SPECIFIED.

2. OVERVOLTAGE SIGNAL (TERMINALS C & D): THESE TERMINALS PROVIDE AN OVERVOLTAGE TRIP SIGNAL TO THE EXTERNAL OVERVOLTAGE CURRENT BREAKER (CB1).

3. IF TERMINAL A- ON THE VOLTAGE REGULATOR IS USED FOR FIELD FLASHING, A CIRCUIT BREAKER SHOULD BE INSTALLED TO DISCONNECT THE BATTERY FROM THE VOLTAGE REGULATOR.

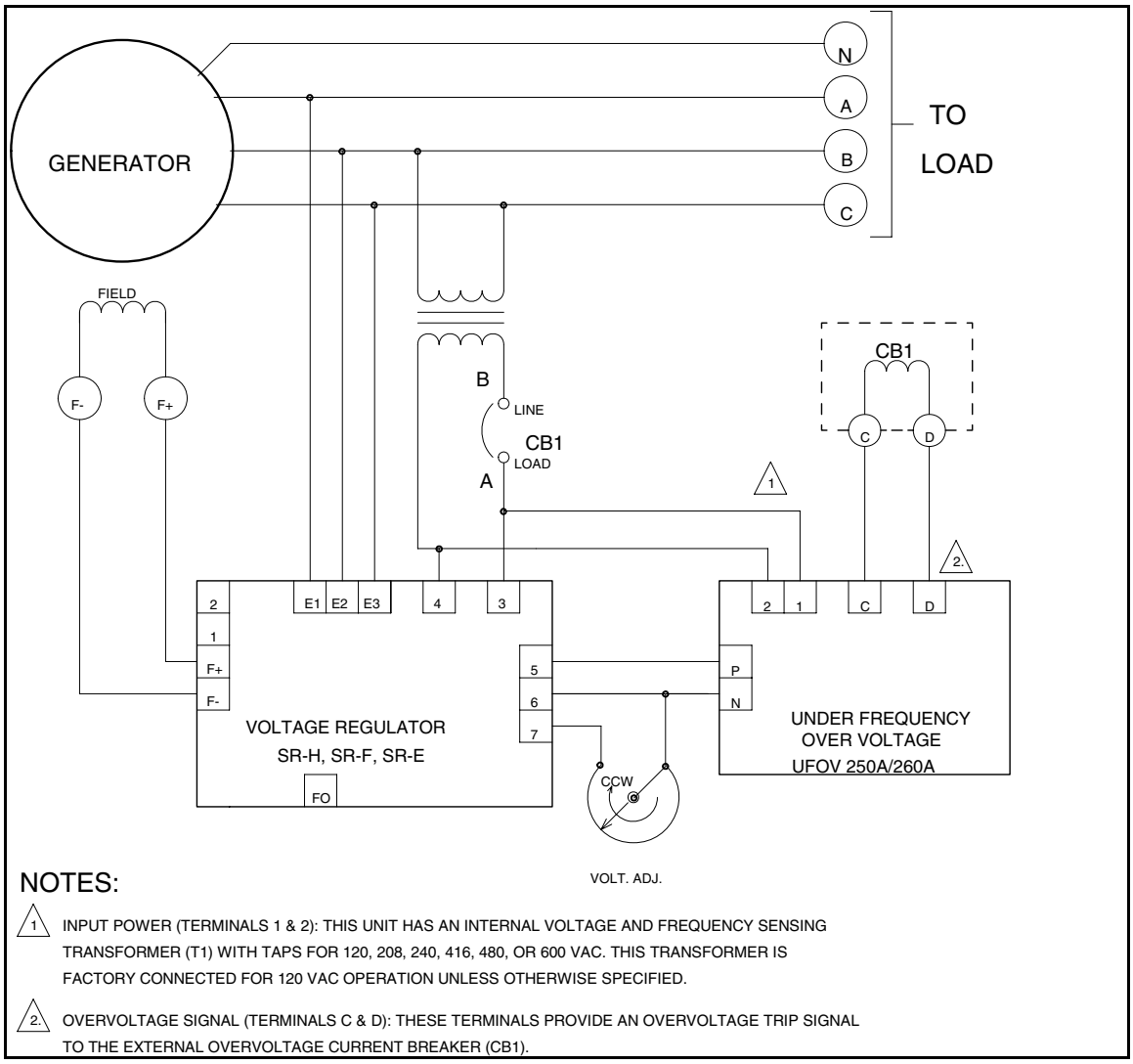
Figure 3-4. UFOV and SR4A and SR8A Voltage Regulator Interconnection Diagram.



NOTES:

1. INPUT POWER (TERMINALS 1 & 2): THIS UNIT HAS AN INTERNAL VOLTAGE AND FREQUENCY SENSING TRANSFORMER (T1) WITH TAPS FOR 120, 208, 240, 416, 480, OR 600 VAC. THIS TRANSFORMER IS CONNECTED FOR 120 VAC OPERATION UNLESS OTHERWISE SPECIFIED.
2. OVERVOLTAGE SIGNAL (TERMINALS C & D): THESE TERMINALS PROVIDE AN OVERVOLTAGE TRIP SIGNAL TO THE EXTERNAL OVERVOLTAGE CURRENT BREAKER (CB1).
3. IF TERMINAL A- ON THE VOLTAGE REGULATOR IS USED FOR FIELD FLASHING, A CIRCUIT BREAKER SHOULD BE INSTALLED TO DISCONNECT THE BATTERY FROM THE VOLTAGE REGULATOR.

Figure 3-5. UFOV and SR32A Voltage Regulator Interconnection Diagram.

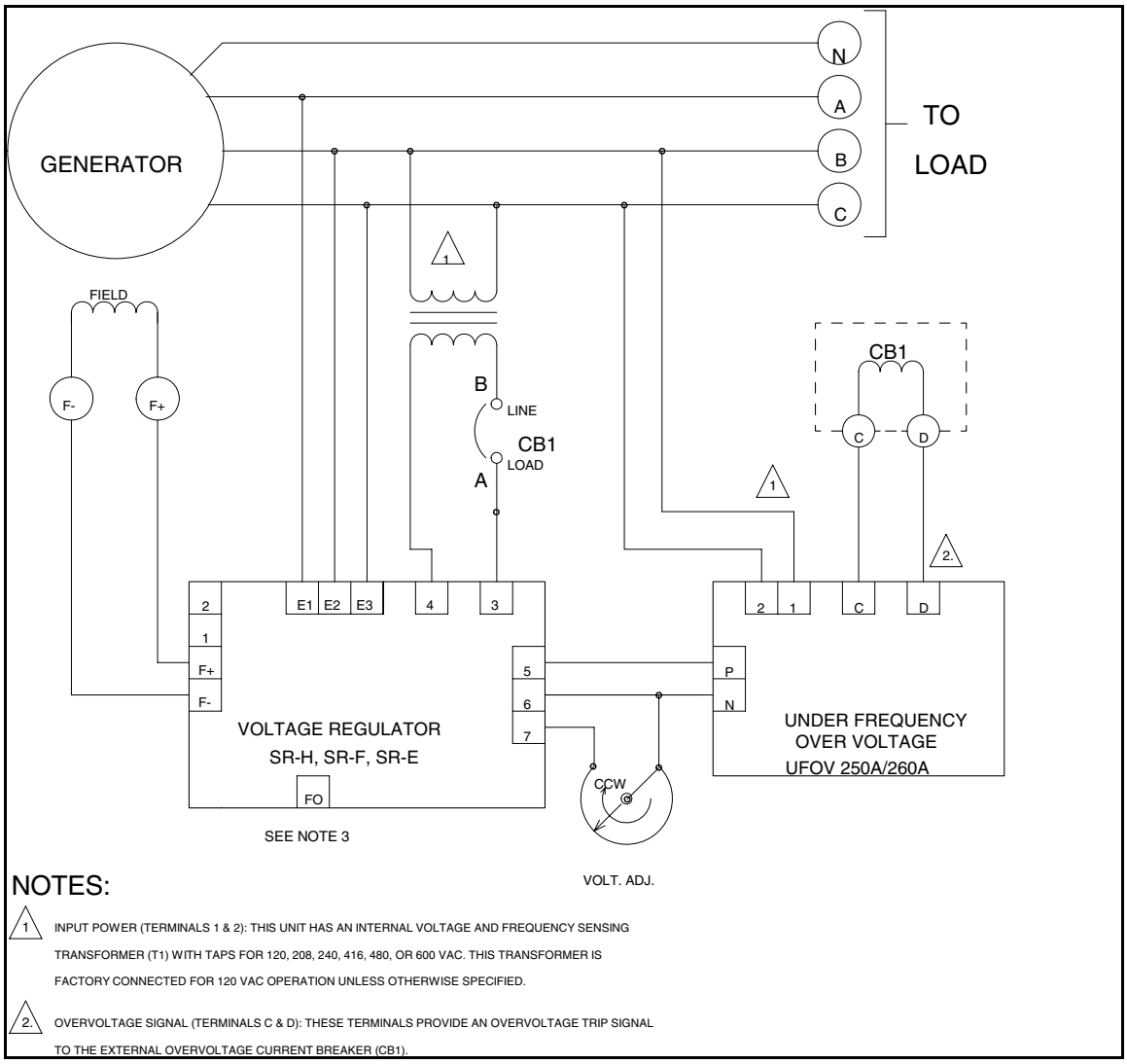


NOTES:

1. INPUT POWER (TERMINALS 1 & 2): THIS UNIT HAS AN INTERNAL VOLTAGE AND FREQUENCY SENSING TRANSFORMER (T1) WITH TAPS FOR 120, 208, 240, 416, 480, OR 600 VAC. THIS TRANSFORMER IS FACTORY CONNECTED FOR 120 VAC OPERATION UNLESS OTHERWISE SPECIFIED.

2. OVERVOLTAGE SIGNAL (TERMINALS C & D): THESE TERMINALS PROVIDE AN OVERVOLTAGE TRIP SIGNAL TO THE EXTERNAL OVERVOLTAGE CURRENT BREAKER (CB1).

Figure 3-6. UFOV and SR63E/H, SR250E/H, or SR-F Voltage Regulator Interconnection Diagram.

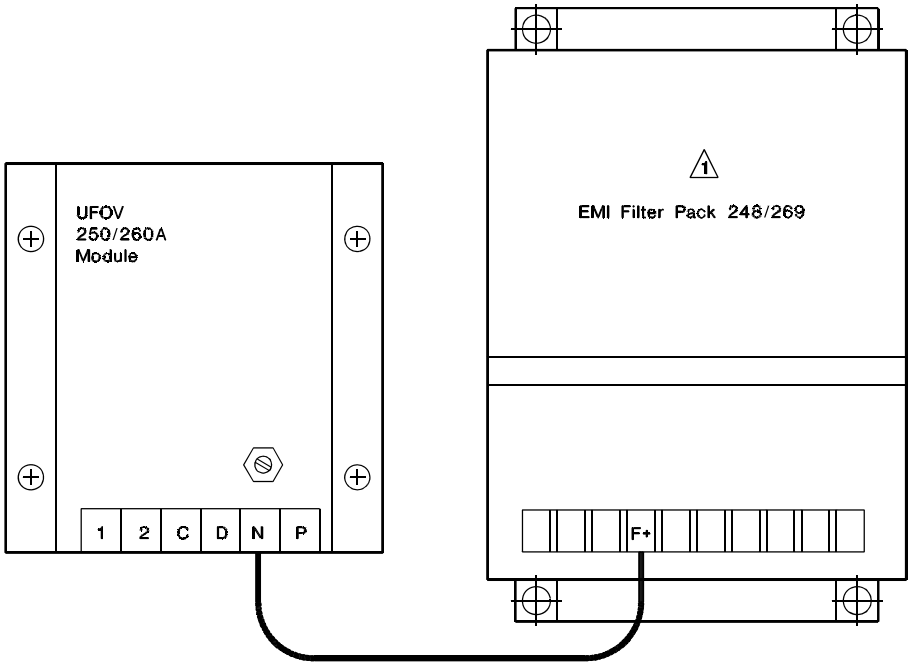


NOTES:

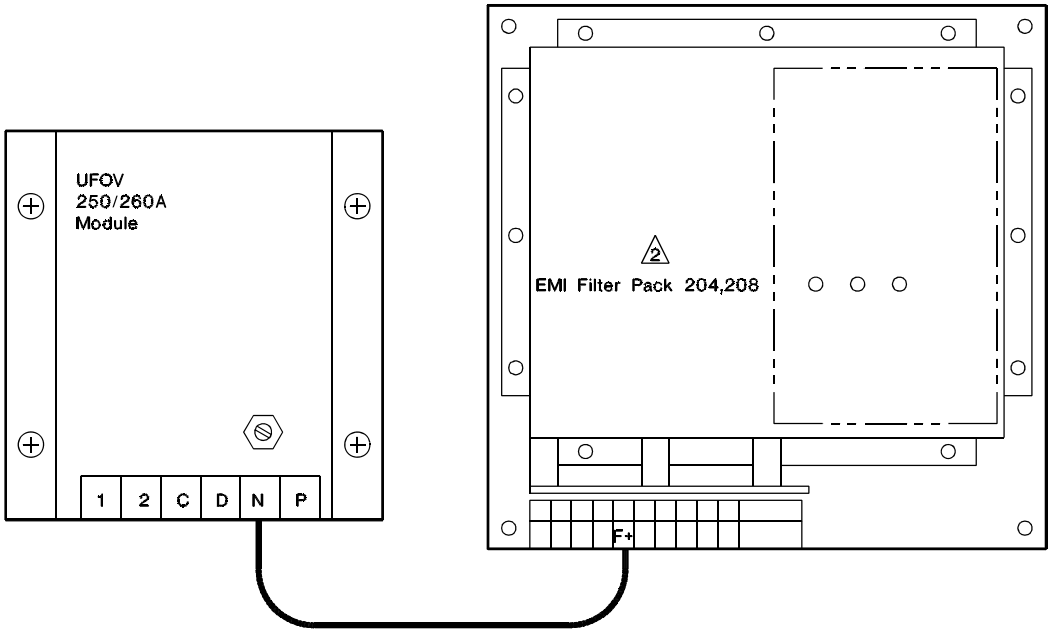
1. INPUT POWER (TERMINALS 1 & 2): THIS UNIT HAS AN INTERNAL VOLTAGE AND FREQUENCY SENSING TRANSFORMER (T1) WITH TAPS FOR 120, 208, 240, 416, 480, OR 600 VAC. THIS TRANSFORMER IS FACTORY CONNECTED FOR 120 VAC OPERATION UNLESS OTHERWISE SPECIFIED.

2. OVERVOLTAGE SIGNAL (TERMINALS C & D): THESE TERMINALS PROVIDE AN OVERVOLTAGE TRIP SIGNAL TO THE EXTERNAL OVERVOLTAGE CURRENT BREAKER (CB1).

Figure 3-7. UFOV and SR32E/H Voltage Regulator Interconnection Diagram.



INTERCONNECTION: UFOV - EMI Filter Pack 248/269



INTERCONNECTION:UFO - EMI Filter Pack 204, 208

NOTE:

1. VOLTAGE REGULATOR SR4A, SR8A, SR6A, OR SR9A
2. VOLTAGE REGILATOR SR4, SR6, SR8, AND SR9
3) EMI FILTER PACKS SHOWN WITH COVER REMOVED.

Figure 3-8. UFOV and Filter Pack Connection.

CAUTION

This information (Figure 3-7) is provided to alert users to the fact that UFOV 250A (P/N 9 1051 00 106) and UFOV 250A (P/N 9 1051 00 105) are interconnected differently then model UFOV 250 (P/N 9 0400 00 104) and UFOV 250 (P/N 9 0400 00 100) previously supplied. Portions of the interconnection diagrams are shown below to indicate the area in which wiring changes occurred. Refer to the appropriate instruction manual for complete inter-connection detail.

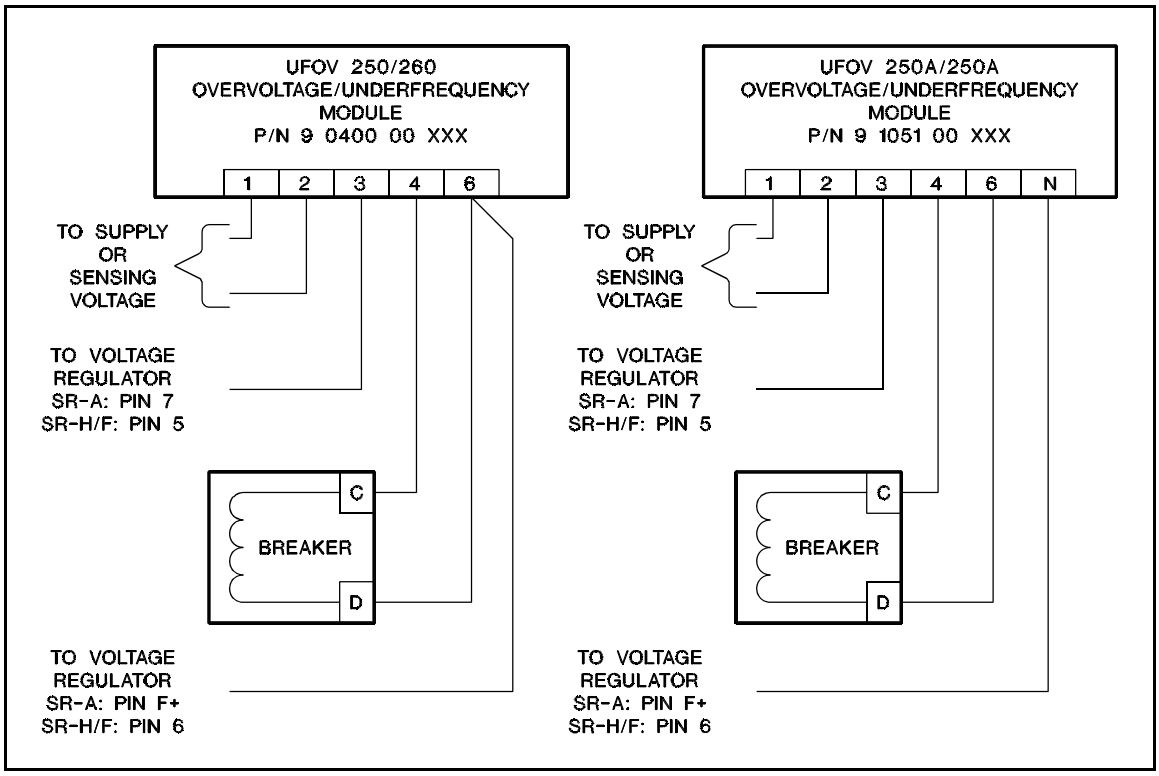


Table of Corresponding Terminals

Model and Part Number	Terminals
UFOV 250A (9 1051 00 106) UFOV 260A (9 1051 00 105)	1, 2, P, C, D, N
UFOV 250A (9 0400 00 104) UFOV 260A (9 0400 00 100)	1, 2, 3, 4, 6*

* Note that of the two connections previously made at terminal 6, only one of them (terminal D of the breaker) is connected to terminal D of the UFOV Module. The second connection is made to the "new" terminal N.

Figure 3-9. Terminal Cross-Reference.

SECTION 4
TROUBLESHOOTING

4-1. GENERAL

Some of the possible malfunctions that may occur and the appropriate repair procedures are listed in Table 4-1.

Table 4-1. Troubleshooting.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. UNDERFREQUENCY CIRCUIT AFFECTS GENERATOR CIRCUIT AT NORMAL SPEEDS.

Step 1. Verify that the correct model UFOV module is being used.

If the incorrect model is being used, contact the factory.

Step 2. Verify that the correct voltage is being applied to the UFOV module.

If the incorrect voltage is being used, reconnect the UFOV input power taps.

Step 3. Replace the UFOV module.

2. UNDERFREQUENCY CIRCUIT FAILS TO REDUCE GENERATOR VOLTAGE AS THE FREQUENCY IS REDUCED.

Step 1. Verify that the correct model UFOV module is being used.

If the incorrect model is being used, contact the factory.

Step 2. Verify that the correct voltage is being applied to the UFOV module.

If the incorrect voltage is being used, reconnect the UFOV input power taps.

Step 3. Verify that the generator is actually 4 - 7 Hz below nominal frequency.

If frequency is not low enough, lower frequency to check circuit operation.

Step 4. Verify that the unit is properly connected into the generator system.

If unit is not connected properly, rewire/reconnect as necessary.

Step 5. Replace the UFOV module.

Table 4-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
3. UNITS FAIL TO OPEN CIRCUIT BREAKER DURING OVERVOLTAGE CONDITIONS.
Step 1. Check for incorrectly wired connections and/or defective wiring. Replace or reconnect wiring as necessary.
Step 2. Check for proper adjustment of unit. Readjust as necessary.
Step 3. Check for defective circuit breaker coil. Replace circuit breaker if coil is defective.
Step 4. Replace the UFOV module.

SECTION 5
REPLACEMENT PARTS

5-1. GENERAL

Table 6-1 lists components that have maintenance significance. When ordering parts from Basler Electric, always specify the description of the item, part number, and quantity.

Table 5-1. Replacement Parts.

Reference Designation	Basler Part Number	Description
----------	9 1051 00 100	Circuit Board, UFOV 260A
----------	9 1051 00 101	Circuit Board, UFOV 250A
L1	BE 13693-002	Choke
L2	BE 08794-010	Choke
T1	BE 14101-002	Transformer

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